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S.U.N.

Sinclair Users' Network
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Palatine, IL 60074
(312)934-9375

The Users Group for ZX80-81 and TS1000 Computers

VOL. 2 JANUARY 1983 ISSUE 1

SINCLAIR

Starting in January, 1983, Sinclair Research in Boston, MASS. will act as an independent distributer of Timex Sinclair 1000 products in the lull between the final sales of the ZX-81 and the launch of Sinclair's next consumer electronic product, the Sinclair flat screen TV. Sinclair offers software tapes of special interest to S.U.N. members and with the input of interested and enthusiastic users will build on the already existing range of available tapes. Do please write to the Boston office to let them know what kind of programs you would like to see available for the ZX/TS computer. The sooner that you let them know, the earlier next year you will find your request answered as the lead time is about 4 months. The Sinclair TV is still under wraps though we will have the details on it as soon as the news breaks on this exciting product.

The tapes currently being sold through the Sinclair administrative office in Boston cover both unexpanded ZX/TS computers as well as those with RAM packs. The 16K versions will sell for $15.00 with the others going for $9.00 per cassette. There are ten $15.00 tapes: Backgammon /Dice, Chess/Chess Clock, Space Raiders and Bomber, Flight Simulation, Qube, Stock Market Analyzer, Super Math, Vu-Calc, Vu-File, and the Coupon Manager. In the $9.00 category there are four titles: Super Programs 1, 2, and 7, and Statistics. In the Super Programs packages you receive 5 or 6 games and a little conversion routine per package.

CONTINUED ON PAGE 4

TIMEX

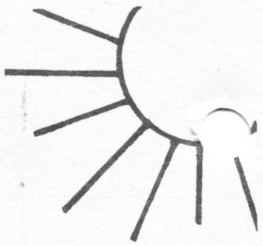
This month Timex goes to the Computer Electronics Show to announce a range of exciting new products. The Spectrum comes to America for this show under the name of the TS2000. The resources of Timex will bring this fine color computer to our shores sometime in the second quarter of this year. The price rumors heard indicate that it will sell in the $150 to $300 price range. Hopefully the cost spread on this color computer, capable of hooking up to multiple disk-drives, indicates the 16K RAM and the 48K RAM versions. At any rate, it's a fact that this unit has a 16K ROM BASIC, color graphics, and keys that really move!

Also announced will be the Timex version of the Sinclair printer. This printer employs electrostatic printing techniques. It will be sold as the TS2040 for a list price of $99.95. Being sold at the same price is the Timex modem. No model number is available but this telecommumication device will link our ZX/TS computers with the outside world at 300 baud. Reportedly, it comes complete with built-in software. These two new devices should hit the retail market sometime shortly after April 1.

A product which should be introduced shortly is a new cassette. This software is Timex's version of the popular game 'FROGGER'. It will be reviewed in full sometime in the next couple of issues, but suffice it to say that it is the licensed version of the game and will sell at the retail level for $17.95.

CONTINUED ON PAGE 4

What's Under the S.U.N.



Please note that as of January 1, 1983 our zip code has been changed from 60067 to 60074. Please make the change on your I.D. card and keep it handy for any correspondence. Also, one of our ads which was printed in Computers and Electronics magazine had our address incorrect. It is 2170 Oak Brook Circle not 170. Many thanks to the Palatine Post Office for their assistance in getting your mail through.

Members who have been with us for a while will find several new columns. One, called, 'A BASIC Understanding', will help those new to computing get past the hurdle of learning 'computerese'. This jargon may keep many people away from computers, even though Clive Sinclair has made them affordable to us. Another new section promises to make you all 'Machine Code Magicians'! While your ZX/TS might not be able to pull a rabbit out of a hat, you will find that learning a little machine language will go a long way towards making your computer really work for you. 'The Power of Vu-Calc' will continue to increase your understanding of this potent program while 'The Truth About Data and Read' will allow you to use many programs written in BASIC that incorporate DATA, READ statements.

Several articles and tips in this publiation have been submitted by members. We founded our club to share information so if you know something and want to share it with others, please send it in. We will try to publish any useful article--our motto for this is 'All the news that fits, we print'!

Any out of town members who intends to fly in or out of O'Hare airport in Chicago should please feel free to contact us. We are located only about 20 minutes from the airport and would love to visit with you. Give us a call or drop us a line before you arrive.

On the back of your newsletter in the bottom left hand corner are your line credits. These include your program lines through and including January 1983. All 1982 members may note a small Christmas bonus. Those who have been active contributors may find quite a large number in this space--remember, the more you submit to the program bank, the more that you may withdraw.

Plans for the Network's bulletin board speed ahead! We have puchased an Osborne I with modem, and plan to open up this electronic communication system to S.U.N. members by late March, at the latest. Current plans have you logging on with your I.D. number, but there will be some kind of encryption key so that relatively private messages may be exchanged. No later than July 1, this system will allow you to call up and 'buy' and 'sell' programs to the exchange -- the purchase medium will be line credits, of course. Notices for equipment sales will be allowed. Questions may be posted as well as calls for sub-groups for members interested in

CONTINUED ON PAGE 22

DECLARATION OF PRINCIPLES

-- To our knowledge, all submitted information contained within is factual, and originates with the author.

-- Accepted copy must be pertinent to the ZX/TS computers

-- The expressed opinions in these articles are those of the writer; These opinions represent the S.U.N. staff unless stated otherwise.

-- Articles submitted electronically will require verification.

-- We are not responsible for mistakes in advertising presented to us; liability rests with the advertiser or their agent.

-- We welcome and will attempt publication of views of others although we reserve the right to edit it.

HELP!

-- When using a new cassette, we've found that the best way to prevent problems is to 'record' at a volume of zero before the first use. In our experience this works better than a bulk tape eraser.

-- When setting up your computer, if you cannot get a good picture using your fine tuning control, twist the connectors in the sockets on the lead from the computer to the switch box at the TV, then try switching the box back and forth several times. Occasionally a little dirt or oxidation might cause a less than perfect contact to occur.

-- For those of you who, like us, had or are having problems with the DIM statement, as applied to two dimensional arrays, here is a method that hopefully will help you use this command. Imagine that you must reserve seats on a train for some group that you belong to. You are told that you must purchase your tickets in advance and that the train has compartments that hold 20 people each. Since there are 140 in your group, you must purchase 7 blocks of 20 seats each. This is equivalent to the statement, '1000 DIM A$(7,20)'. You now may, in your program, have 7 arrays containing 20 characters or spaces each. The arrays must be labeled A$(1), A$(2),.....A$(7).

-- For those wishing to hook up their ZX/TS computers to a monitor, Bob Ziskind writes: Tap a line from 'USA3' pin off modulator and use any ground. Bob used Belden 174 coax. S.U.N. finds that not all video monitors are created equal. You might have to build a buffer for Apple III monitors. With most others this modification works great as is.

-- Use caution when purchasing peripherals such as floppy disk and printer I/O's, modems, and Hi-Res graphics boards from different manufacturers. You might find that you have two products trying to use the same memory locations! Inquire before you buy.

Extend your ZX81* System: Add Memory that won't Forget!

*or TIMEX 1000

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- COMPATIBLE WITH 16K RAM PACKS

$29.95

This memory board is designed to fill the transparent 8K block of memory (from 8 to 16K) in a ZX81-16K system. The use of HM6116P 2K CMOS RAM memory IC's with their own reserve power supply means that routines stored in the RAM are nonvolatile — the RAM retains its memory even when the ZX81 is switched off or reset. Moreover, being RAM, the routines you store in the memory are easily modified.

With this board it's no longer necessary to place your machine language routines in REM statements, in string variables, or beyond RAMTOP. You can build up a resident library of machine utilities for use by your BASIC system.

Complete step-by-step instructions in a 14 page manual make assembly of the board easy. Construction takes between one and two hours. The kit (pictured above) is complete with a silkscreened solder-masked printed circuit board, all capacitors, resistors, transistors, sockets, connectors, integrated circuits, and the lithium cell. The board is supplied with one 2K CMOS 6116P-3 RAM — it will accomodate three more for a total of 8K.

Send check or money order for $29.95 plus $1.95 shipping and handling to the address below. The printed circuit board with the instruction manual is available separately for $15.00 post paid.

HUNTER, 1630 FOREST HILLS DRIVE, OKEMOS, MICHIGAN 48864

-- Think of the FOR-NEXT loop as simply being a counter. If you had to take 10 bricks from a pile of bricks, you must keep track of your work or you'll probably remove an incorrect number. To see how this works, use this program:

```
10 LET PILE =100
20 FOR A=1 TO 10
30 LET PILE=PILE-1
40 NEXT A
50 PRINT PILE
```

Run this program and you'll see that the pile, having lost 10 bricks, now consists of 90. Lighten your work by changing line 20 to:

```
20 FOR A=1 TO 10 STEP 2
```

This time, you only remove a brick every other time through the loop!

SINCLAIR Continued from page 1

To give you a better idea of what games are in the packages here is a brief description: Invasion from Jupiter, Doodle, Secret Code, Kim, Silhouette, Chase, Tower of Hanoi, Golf, Docking the Spaceship, and Racetrack. To receive additional information, this office may be contacted by writing to Sinclair Research, LTD., Software Dept. Their address is 50 Staniford St., Boston, MA, 02114.

Cambridge, England, home of the research and development section of Sinclair Research, is becoming a high technology center to reflect, if not rival, Sunnyvale, CA and Boston, MA. Clive Sinclair recently moved his team into the company's new headquarters in the heart of the city. Apart from research projects, dealing with consumer electronic products, Clive is a partner in the new publishing firm of Sinclair Browne which was formed in June of 1981. Who knows what might come in the future from an inventor of such diversity.

TIMEX Continued from page 1

Another new development from Timex is their computer club for all registered TS computer owners. Club membership is free to al owners of the TS1000. Timex ha also established a toll free number to answer consumer questions. This hot-line may be reached by dialing 1-800-24TIMEX. For those of you, like us, who don't have letters on your phones, TIMEX on your dial is 84639. This number will get you the location of the nearest Timex/Sinclair Computer dealer in your area, pre-purchase product information, and user support through operators trained to provide technical assistance.

By continuing to read this column, you will learn more about this new service along with upcoming Timex hardware and software releases. Timex intends to become the leader in home computer products and based on information we have recently received, they should succeed. Supporting their line of products is the best step in thi direction.

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From Theirs To OURS

	APPLE	PET	TRS-80	ZX/TS
1.	CALL	NONE	USR	USR
2.	SAVE	SAVE	CSAVE	SAVE
3.	LOAD	LOAD	CLOAD	LOAD
4.	NONE	NONE	NONE	RAND
5.	CLR	CLR	CLEAR	CLEAR
6.	DATA,READ	DATA,READ	DATA,READ	NONE
7.	COLOR	NONE	NONE	NONE
8.	DIM X(Y)	DIM X(Y)	DIM X(Y)	DIM (X,Y)

In this continuing series designed to assist those of you who look longingly at the many books full of software listings for brand 'x' computers, and wish that it was available for the ZX/TS machines, eight new commands are presented. In a change of format from our first article, we will take each command and describe the differences, or similarities, between the way Clive Sincair's ROM handles that function, and the way it is used by the other computers. Some commands have not been listed in these articles simply because all BASIC language computers do use many expressions and statements in like fashion. It varies from computer to computer. The Apple and Atari use the same chip, and except for graphics, their versions of BASIC are very similar. The Pet, although using the same chip as the Apple and Atari computers, has a language with many symbols peculiar unto itself. The TRS-80 Model III uses the same chip as the ZX/TS computers, the Z80, but in many areas its BASIC coding is very different. Hopefully this series will help you understand both the differences and the similarities so that you may translate all of the published programs for use on your ZX/TS.

The first command listed is used to access a machine code routine written to a specific decimal address. The feature, unavailable to Pet owners, allows you to run machine code programs. Notice that with the Apple, you CALL your code. Radio Shack users are able to access their machine language programs much as we are.

The second and third commands involve the use of our Tape Operating System or TOS. Of the other computers listed, only Radio Shack uses a different command. They all work, however, in a very similar fashion.

Notice the fourth command is only available to the ZX/TS through BASIC. With the other units, you may POKE or write machine code to reset your random number seed, but with our computer it is a one keystroke entry. It appears, again, that the logic employed by Clive Sinclair's micro-whiz beats them all--and in only 8K!

This month's fifth BASIC comparison is used identically by all of the machines to reset all variables to zero. Of the other computers, the Radio Shack unit is the only one that is spelled identically but on the TRS-80 you must, of course, type in each letter. CONTINUED ON PAGE 8

The Truth About 'DATA & READ'

Although the BASIC functions DATA and READ are not implimented on our ZX/TS computers directly, there is no reason why the ZX/TS user should not be able to mimic them. Following this short explanation there are listed two routines, one for numeric and one for non-numeric data, that bring the power of these statements to your computer. In our routines, the data is stored in strings. You may place it there within your program using a LET statement while writing the program or you may load the string using INPUT while your program is running.

A lengthy way to mimic these functions is by slicing strings as in the following program:

```
10 INPUT A$
20 PRINT A$
30 INPUT A
40 PRINT A
50 INPUT B$
60 PRINT B
70 LET B$=A$(A TO B)
80 PRINT B$
90 PRINT "RE-INITIALIZE? Y/N:"
100 IF INKEY$=""THEN GOTO 100
110 LET C$=INKEY$
120 CLS
130 IF C$="Y" THEN GOTO 10
140 GOTO 20
```

Enter this program and run it. Input, "MONTUEWEDTHUFRISATSUN", then press (ENTER). Upon receiving an "L" prompt, input,"1", then input,"3". You will see, "MON". Press "N", then input, "4", and "6". Keep adding 3 to each input and you will notice that you have "sliced" out the days of the week. Add 3 lines:

```
82 LET A=A+3
84 LET B=B+3
86 GOTO 70
```

Now type in "(GOTO)15". Upon receiving an "L", enter "1" and "3". Notice the change in results. Load any combination of characters into A$, change the incrementing values in 82-84, or just delete them and play with this program.

There is a simpler and more elegant solution. To help understand how it works, enter this routine:

```
10 DIM A$(3,1)
20 LET A$(1)="S"
30 LET A$(2)="U"
40 LET A$(3)="N"
50 LET B$=A$(1)+A$(2)+A$(3)
60 PRINT B$
```

Line 50 concantenates the 3 arrays into 1 string. Line 60 prints the name of our organization! Try these changes:

```
20 LET C$="NUS"
30 FOR I=1 TO 3
35 LET A$(I)=C$(I)
40 NEXT I
50 LET B$=A$(3)+A$(2)+A$(1)
```

This gives the same result.

Finally, we get to our two solution routines. The first routine assumes that you wish to print out a series of numeric data values stored in a string much as if they were stored as DATA in other versions of BASIC. The VAL command is used so that if you wish to use these numbers in a math operation you may. We have even considered that these numbers are carried out to two decimal places, as you would do with money. In this routine, we have assumed that the maximum value of the data is 999.99, but you may add more zeros, as spaces, and change the size of the loops to provide larger values. The second routine is for alpha information so it is simpler. We have assumed that your message is five characters long, but you can use (SPACE) to lengthen them if necessary.

CONTINUED ON PAGE 21

TO BUY OR NOT TO BUY ?

Software

PROGRAMMERS TOOLKIT GRAPHICS KIT

by Softsync

This month we had the pleasure to review two of the most useful, if not entertaining, software utilities to date. These packages, which require 16K RAM packs, are called the 'Graphics Kit' and the 'Programmers Toolkit'. Both packages are compatible and relocate above RAMTOP so that they will neither be overwritten by your BASIC programs, nor be erased by (new).

The 'Graphics Kit' contains 23 separate machine code routines which are called by POKES and USR instructions. These routines may draw and erase pre-defined shapes, fill a specific area of the screen almost instantly with the character of your choice, turn on or off background or foreground characters or shapes, place a border around the screen, even into line 22, change a section of the screen into inverse characters or change inverse back to normal, switch screens or characters on or off or scroll them in all four directions, draw squares or rectangles, and search through the screen for specific characters and replace them with other defined characters. There are 11 error codes that are generated when certain errors are made, but with this, as with all other machine code programs, you can really bomb out a program and cause your ZX/TS to crash, losing programs and data. Since this can be done quite easily by just using the keyboard itself, we do not find this to be a problem associated with this program.

The 'Programmers Toolkit' consists of eight separate facilities. These routines will allow you to renumber BASIC program lines, in increments of your choice, search a program for a specified character and list the line numbers that it occurs in, fill specified lines with the character of your choice or invert the characters, alter the starting address of the character set, find out how many free bytes in memory that you have, which of course, by subtraction, gives you the length of your program, and set up a hold condition in your program where-by no processing takes place until input is received from your cassette player.

You may use these programs either separately or together. We recommend that you buy both tapes as their value to you will be greater than the sum of each individually. The 'Graphics' tape comes with a demo program that visibly demonstrates not only the power of these packages, but the potential of your ZX/TS computers when enhanced by this software. Together the 2 programs reside in 3105 bytes of memory.

They may be ordered from: SOFTSYNC INC., P.O.Box 480, Murray Hill Station, New York, NY 10156 and they are priced at $14.95 each.

CIOUTIL by Cosmonics

This $17 cassette provides the owner of the ZX/TS computers the capability of generating data from a program, writing that data onto a cassette, and then reading the same data from the cassette for use in a different program. This utility program resides in about 500 bytes of memory and may be located above RAMTOP.

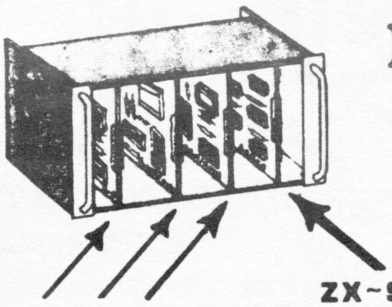
CONTINUED ON PAGE 16

Modem & Serial I/O
by L. Kelly Ph.D.

The Byte-Back MD-1 modem comes with an RS232C port. The package, as received, came without a case, but later shipments will include an attractive metal enclosure.

The RS232C port plugs into the ZX/TS expansion connector and uses two unused addresses in the ROM which can be changed if necessary. TTL or RS232C signals may be selected. A BASIC program is also provided to test the interface.

The modem plugs into the RS232C port and may be connected to your phone using RJ modular or other connectors. The baud rate is selectable by modifying the board and the software. By making these changes, the RS232C port may operate at speeds from 75 to 9600 baud. The modem transmits and receives at 300 baud, the standard speed of the RS232C port. The modem requires 2K of RAM, so 1K units will need memory expansion.



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Software, other than the BASIC testing routine is sold separately. It may be ordered either as a listing with documentation or both with the programs recorded twice on a cassette. It would be advisable to order the software as developing your own telecommunications routines as this type of program is very tedious to write. With this complete package of software, serial interface port, and modem along with your expanded ZX/TS computer and TV set, you will have a working terminal that will allow you to 'talk' to the outside world. Using this package, hookups to various bulletin boards, such as the one soon to be opened to all S.U.N. members, are possible.

It appears that Byte-Back has done a good job and their product line is well worth the price. At the time of the review, the modem/serial port combination sold for $119.95 as a kit and $149.95 assembled and tested. The listing and documentation for the 'driver' software costs $10. both, along with the cassette, sell for $29.95. You may order them from: BYTE-BACK Co., Rt.3, Box 147, Brodie Rd., Leesville, SC, 29070. Their phone number is :1(803)532-5812. At present the are set-up to take AMEX, VISA, and Master Card. They also sell other products to enhance the utility of our ZX/TS computers.

FROM THEIRS TO OURS CONTINUED FROM PAGE 5

For an explanation of DATA, READ, turn to page eight.

Of the computers in this group, the Apple has the only COLOR output, but through ZX/TS add-on boards and the soon-to-be-released Spectrum/TS1000, the list will grow to two!

The last command dimensions arrays for all the computers the same way. We, however, think it is keyed in more simply on the ZX/TS machine.

Stay tuned for more command translations in this column in the future.

Bookshelf

TIMEX SINCLAIR 1000
by Robin Jones & Ian Stewart

Birkhauser
Boston MA

$10.95

THE ZX81 COMPANION
by Robert Maunder

Creative Computing Press
39 E. Hanover Ave.
Morris Plains, NJ 07950

$9.95

Just when we had begun to despair over our inability to heartily recommend a ZX/TS book to our readers, we have found two that merit purchase. Our goal in these reviews has been to identify books that, studied in conjunction with the ZX/TS manual, will allow an individual to not only master simple programming techniques, but to become proficient at all phases of tricking information from our computers.

The first book is simply titled: TIMEX SINCLAIR 1000. This book is full of program examples and tips and is quite thorough in its description of various methods to graphically display data. There are dozens of programs dedicated to this end with a good percentage of them games. The book starts much as our manuals do with a description of how to hook up the leads on your ZX/TS and properly tune in your TV sets. In this early section of the book we found that the 'cuteness' evident in the table of contents extends into the manuscript. This work averages slightly more than one corny joke or cartoon per page, possibly more than would be required to make this 'reader friendly'. For those of us either young in age or young at heart, though, many a chuckle as well as much information will be found within. One feature we found to be very useful was that in every few chapters a section on debugging was inserted. Most books either give us the obligatory "every program has bugs, so work your's out", in the first or last chapter. Here, when a new programming technique is covered, you are quickly talked through debugging the errors that might arise from practicing your newly found knowledge. All in all, we found the strengths to outweigh the failures of this book to make us all master programmers.

The second book is called: THE ZX81 COMPANION. This work is far more serious than the one discussed previously. It does not parallel your manual and is not for the absolute novice to computing. There are three programming sections to this book: graphics, information processing, and education. Each section is surprisingly thorough, probably by confining itself to one area without leaving out a group of programming examples. The graphics section gives the reader a view of both static and geometrical drawing as well as the methods of moving an object across the screen, both under control of a program as well as by the user of the computer. The second chapter, on information processing, is far more comprehensive in its description of building a filing system through the use of arrays and strings than is our manual. The reader will quickly find that the use of the common BASIC statements, 'DATA and READ', are not necessary for programming. This section also discussed setting up menu-driven systems as well as the design of programs that are easy to use and avoid constantly halting with an error code when the operator makes an entry error. The area on education was particularly enjoyable. This book offers many lively examples for both 1K/2K and 16K computers to both educate and entertain. There was a fourth non-programming section to this work.

CONTINUED ON PAGE 15

TO BUY OR NOT TO BUY?

Hardware

MW-100 PRINTER by Mindware

All of us need a printer for listing programs and keeping 'hard-copies' of records. Budgetary restraints cause most of us to balk at buying most impact printers, while non-impact printers mean expensive and not readily accessible paper. The Mindware MW-100 Printer has neither of these problems. The unit comes complete with its own power supply, which also powers your ZX/TS computer, a roll of paper, and a ribbon cartridge.

The ribbon cartridges are a stock item at all Radio Shack computer stores and are also carried at most of their regular stores. The paper is standard 1 and 3/4 inch wide plain roll paper which can be purchased at almost any office supply store. The power supply has a plug that almost cannot work loose to crash a program and the cable to the computer terminates in a connector that mates with the card edge buss in the back of the ZX/TS much more securely than does the RAM pack. This connector has a card edge behind it for RAM packs and other accessories that has solder lines on it slightly thicker than do our computers, so contact with additional devices is more secure than without the printer.

The printer delivers sharp, clear letters and graphics, but at a very slow rate. The width of each line is 16 characters and the printing speed is slightly less than one line per second. There is a choice of 3 modes of printing. The first allows programs to be listed using two lines for each line on the screen. The second provides a screen dump in which the first 16 characters of all 21 lines on the screen are printed followed by the last 16 characters of each line. You may then tape together the printout, but as the printing does not go from one side of the tape to the other, you must cut off the sides of the tapes and this is a tedious task. The third mode is useful when you have lines no longer than 16 characters on the screen and want to dump them from the computer onto paper.

All in all, we found this printer to be well built, with an attractive case, and a very clear print quality. We found it to be slow and noisy, compared to the more expensive printer/interface combinations, and did not like the split-screen dump mode. If you need an inexpensive, small printer for your ZX/TS, though, you might find that the MW-100 will satisfy your needs. Currently it costs $129.00, plus shipping and you can order it from: Mindware, Inc., 15 Tech Circle, Natick, MA, 01760. They can also be reached by phone at: (617)655-3388.

CRASH GUARD by Expense Cutter Products

We recently received a product that falls into the category of , 'Why didn't I think of that?'! This is an acrylic work-base for our ZX/TS units, with a RAM pack, that certainly lives up to its name of 'Crash Guard'. All of you, we're sure, have probably had the misfortune of just entering the last line of your 'super' program only to inadvertently jiggle the RAM pack while setting up your tape recorder and watch your screen go blank and the infamous 'K' cursor appear. We have advised, and resorted, to the practice of taping on our RAM packs.

CONTINUED ON PAGE 13

MACHINE CODE MAGIC

As one of the purposes of this newsletter is to educate, as well as to inform our members, this article is dedicated to those who wish to go PEEKing around into our ZX/TS's memory. To fully understand what this means, carefully read the last few chapters of the ZX/TS manual concerning numbering systems, Z80 Code, and the way our ZX/TS interpreter uses this code in programs, variable storage, and memory allocation. It would also be helpful to pick up a book on Z80 assembly language. Perhaps one of the best is the book titled: Z80 Assembly Language Programming. It is written by Lance A. Leventhal and published by Osborne McGraw-Hill. There is no need to try to memorize the chapters of your manual and this book, at present, just have them handy for referral purposes. Over the course of this series of articles, of which this is the first, you will learn how to understand machine code as well as program in it. This first article will provide you with a simple programming tool, called a disassembler, that will allow you to use a BASIC program to examine the machine code stored in your computer's memory.

To use this program, which follows this short explanation, enter it, save it on tape, and after it starts, you will notice several things on the screen. First, the location that you are at is displayed. Next you will find the hex/op code stored at the memory address. You must use your ZX/TS manual and your Z80 book to fully understands this at this point. Alongside that will be the character corresponding to that op code. At the lower left-hand corner of the screen, on the prompt line, you will find a pair of open quotes. If you type in an address, it will appear here. Press (ENTER) and the contents at your requested memory location will be displayed as described above. Simply pushing (ENTER) will result in incrementing the address by one.

Using this program, you will be able to examine the contents of your ZX/TS memory without having to generate a series of PRINT PEEK commands. While this is not a perfect disassembler, it is short, easy to use, and is the core of what will be a complete assembly language tool. Future articles will expand this program as well as provide the knowledge necessary to make you a machine code magician capable of writing programs in the fastest, most efficient, and most compact fashion.

```
 20  LET N=0
 40  LET B$="  (32 spaces)  "
 60  PRINT AT 2,0;"ADDRESS¥¥¥¥HEX
       /OP CODE = CHAR."
 80  LET A$=STR$PEEK N
100  PRINT AT 4,0;N
120  LET N=N+1
140  LET A$=CHR$INT(VAL A$/16+28)
       +CHR$(VAL A$-INT(VAL A$/16)
       ¥16+28)+"/"+A$+" = "+CHR$
       VAL A$
160  PRINT AT 4,13;A$
180  INPUT C$
200  PRINT AT 4,0;B$
220  IF C$<>""THEN GOTO 260
240  GOTO 80
260  LET N=VAL C$
280  GOTO 80
300  SAVE "DSMBLR"
320  GOTO 1
```

Note: The addresses are decimal. You may 'bomb' the program by inputting anything other than an integer from 0 to 65535. A non-numeric character or attempting to 'read' an address higher than 65535 will halt execution. A non-integer might give spurious results.

Using the Power of "VU=CALC"

Probably the most powerful program in the ZX/TS library is the software by PSION known as VU-CALC. From the questions heard from members and non-members alike, it might also be the most mis-understood. As the documentation in a cassette package cannot be lengthy, it is easy to see how confusion may arise. Since this is a program with uses ranging from bowling scores to accounting, bank Christmas clubs to inventory records, a more thorough explanation of the various functions is needed. This column will try to provide that for you.

First, we will use VU-CALC as a simple adding machine. Load the program into your computer. Once the menu is on the screen, press the "E" key, then press the (ENTER) key. You now have an empty table in front of you with three commands listed above the table. Push the "L" key. Note how the grey cursor in box A01 has grown a box above its left corner. This is the call for data. For this example, type in '10' and press (ENTER). Box A01 now has '10' in it. Next, look at the '6' key. See the red arrows on it and the arrows on the 5, 7, and 8 keys? They control the cursor. Push '6'. The cursor is now in B01, if you have not pushed the key for too long. To get the feel for moving the cursor, push the '6' and '8' keys until the cursor is in box Z36. Now press 'H'. notice how the cursor jumped back to box A01? 'H' stands for 'HOME', the name for A01. Carefully position the cursor in box B01. Press 'L','10', (ENTER). '10' should be in both A01 and B01. Move the cursor down to C01 and push 'F'. Look for the grey box in the lower left of your display screen and the message in the black box above the table calling for a formula. Push the following keys in the sequence listed:'A','0','1',(SHIFTED)ed'K'-for the plus sign-'B','0','1', and (ENTER). The grey box in the lower left has been replaced by this formula: A01+B01. The top black box displays: (R)ELATIVE or (A)BSOLUTE. Push 'A'. The black box now asks: MOVE BY (R)OW (C)OLUMN or (E)XIT. Press 'E'. It now appears that you are back to where you've begun, except that you have loaded numbers into A01 and B01 and have a formula in box C01. Press 'C'. Almost instantly '20' appears in box C01. While this, obviously, is a long procedure for calculating the sum of two numbers, most of the important VU-CALC functions have been used. In the next section, our instructions will be less detailed but the example will be more powerful.

Load '10', using the methods in the previous illustration, in boxes A01, B01, C01, D01, E01, and F01. Now put the formula: A01+B01+C01+D01+E01+F01 into box G01. Push 'A', 'E', 'C'. Now, of course, box G01 contains 60. Move the cursor to box A01. Did you push 'H'? That's a faster method than pushing the UP arrow (Key '7'). Load '20' into A01, then push 'C'. look at box G01. It contains 70! Load '100' into box A01, press 'C', and you will find 150 in box G01. Play around with this for a few minutes.

For our last example, press 'Q' for the main menu. Press 'C', (ENTER) to return to the loaded table, then push 'Q' again. This time press 'E', (ENTER). Entering VU-CALC cleans out your table. Load '2' into A01, move the cursor to box A02, and enter the formula '2↑A01'. This time, push 'R' for relative, 'C' for column, and '16' for column number. Push 'C' to calculate. After about 3-4 seconds, the screen comes back. Move the cursor to box A16. Here you will find the maximum number of bytes your computer can address: 65536! You have calculated 2 to the 16th power.

Although these illustrations barely scratch the utility of this program, they do allow you to play with the keys and learn some of the functions. In the coming months, hopefully, you will acquire the knowledge to fully utilize this software.

CRASH GUARD CONTINUED FROM PAGE 10

This works but is certainly an inelegant solution. The 'Crash Guard' solves this problem, looks attractive, as well as professional, and adds a solid feel to your computer. This unit has rubber feet on the bottom to make the ZX/TS skid-resistant; for those who wish, however, felt pads are included to cover them. Insertion of the computer into the 'Crash Guard' takes less than a minute and we do advise that it is well worth the money and small amount of time to do it.

You may purchase the 'Crash Guard' from: Expense Cutter Products, Inc., P.O.Box 9543, Raytown, MO, 64133, or call: 1(800)353-1690. The cost is $19.95 and they accept Visa, Master Card, and American Express.

POWER LINE FILTER by HB Industries

Many of us have resorted to taping on our RAM packs or buying a product to stabilize our computers only to still find that our ZX/TS may 'crash' from time to time. The cause may be power line noise. Finding out the problem, of course, is of little solace to you when your screen goes gray and your keyboard locks up. The solution lies in the form of a small 2" X 1" X 3/4" metal box sold by HB Industries.

This company, a manufacturer of electronic devices for industry, has just a six month involvement in the field of comsumer products. In this time, they have developed, perfected, and started production of this power line filter. We have tested this device extensively over the past month. In conjuction with the 'Crash-Guard', reviewed earlier in this issue, we've yet to have our system lock up on us. Without the power line filter we measured voltage spikes on the order of 600 to 800 millivolts; with the filter the spikes were under 10 millivolts. These power problems are not only line related. If your computer is near your furnace, refrigerator, or other large motor, every time it turns on the magnetic field generated will cause voltage fluctuations in the cord from your transformer to your ZX/TS. Part of the circuitry of this filter is designed expressly to remove this noise.

We found this to be an indispensable add-on to the ZX/TS computer. This product will also reduce the work done by your ZX/TS voltage regulator thereby decreasing the heat to be disipated and increasing the life of your computer. You may order directly from HB Industries. Their address is: 606 Lee St., Suite 4, Des Plaines, IL.,60016. The price of the unit is $19.95 plus shipping, handling, and sales tax (for Illinois residents). Their phone number is (312)297-2285.

FUTURE REVIEWS --

We have received many interesting products lately including mass storage devices and word processing software. Upcoming 'To Buy or Not To Buy' columns will keep you informed of their usefulness for small business applications. Games and joysticks will also be featured -- watch for it here!

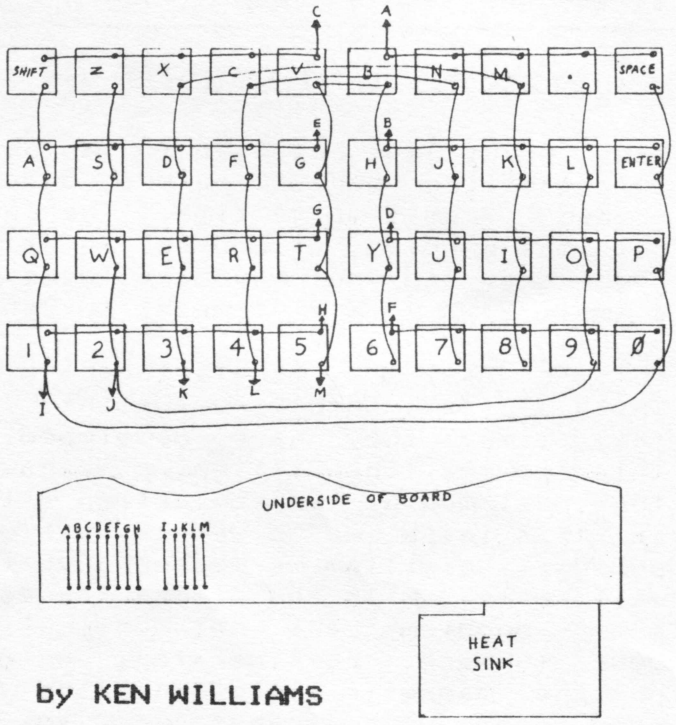
HAVE YOU BOUGHT ANY ACCESSORY FOR YOUR ZX/TS THAT IS SO FANTASTIC THAT YOU WOULD LIKE TO SHARE IT WITH OUR READERS? ON THE OTHER HAND, HAVE YOU HAD A BAD EXPERIENCE WITH ANY PRODUCTS? DON'T FEEL THAT YOU MUST WRITE A 2 PAGE REVIEW. JUST LET US KNOW AND WE'LL BE HAPPY TO PASS THE WORD ON. A NOTE IN THE MAIL OR A QUICK CALL IS ALL YOU NEED DO. TO PROPERLY ASSIST OUR MEMBERS WE NEED TO KNOW OF YOUR EXPERIENCES, BE THEY GOOD OR BAD!

---

input/output

A BIG KEYBOARD

The small keyboard is O.K. for portability, but for serious work a full size keyboard is best. If you're handy, you can save big bucks by buying a bare board and wiring it yourself. I bought mine at a "Hamfest" for $15.00. I had to desolder the printed circuit board (use a "solder-vac"). Then I cut the frame to fit a base (use a hacksaw). Then glue the keys in so they won't move (I used "Crazy Glue"). Turn the board upside down and wire it as shown in the diagram. Ribbon cable is good for making the connections to the computer. I installed a plug and socket between the keyboard and computer so I could still use my ZX-81 as a portable (optional). Be especially careful when soldering to the circuit board as the I.C.'s do not like 110 volts A.C. leaking from your soldering iron. It is wise to tin all leads first and unplug your iron just before soldering each lead to the board.



The special keys are easy to duplicate. Just find a good size picture of the keyboard (I used an ad); cut out each key and glue it to the proper key (I used contact cement). HINT: If part of the printing does not show just put it in yourself. I covered each key with Scotch tape (the frosted kind), for durability. I love my keyboard and you'll love yours, too.

by KEN WILLIAMS

LINE RENUMBERING

Put the following six lines at the start of your program that you want renumbered, then (RUN) it. Upon getting the 'L' cursor, Type in the 27 sub-sets of numbers to the right of the program listing, being sure to press (ENTER) after each sub-set. After the insertion of the last sub-set, the 'L' cursor will be replaced by the message: 9/6. Delete lines 2 through 6. Type in (RAND) (USR) 16514 (ENTER). Now list your program. Voila! The program is numbered by five's. If you would like to renumber by ten, change line 2 in the program listing so that the loop ends at 16545 rather than 16540. You must also change the fifth sub-set of numbers from 156 to 161 and add five more 3's to the string of five in the set of numbers. The 40 spaces after the (REM) in line 1 reserves the machine code loaded in lines 2 through 6. Caution: you must manually renumber your (GOTO)'s and (GOSUB)'s.

```
1  REM---(40 spaces)---
2 FOR A = 16514 TO 16540
3 INPUT B
4 POKE A,B
5 NEXT A
6 STOP
```

```
  1   10    0   33  156
 64   62  118   35  190
194  138   64   35  190
200  112   35  113    3
  3    3    3    3  194
138   64
```

by BOB ZISKIND

CONTINUED FROM PAGE 9

BOOKSHELF

In it you will find a discussion of the monitor and its entry points, as well as a complete listing, both hex and op-codes, of the Z80 control routine that governs our computer. Finally, an appendix contains several great 16K programs that will be fun to one and all.

To summarize, we have found two volumes, different in style, but both doing a good job of filling the gaps left by our ZX/TS manuals. With either, or both, of these books, you can write most of the programs that you've always desired.

THE WATCHMAKERS GUIDEBOOK to the TIMEX SINCLAIR 1000 COMPUTER

published and written by
TSG Enterprises
54 Richwood Place
Denville, NJ 07834

$3.95

For those who've wished that the yellow pages of the phone book had a ZX/TS computer section, we've found the next best thing. We just recently received a copy of this 40 plus page compendium and counted over 170 producers of hardware, software, supplies or nformation to enhance the utility of our own machines. In addition, it offers you a small bonus in the form of helpful programming hints for beginners.

This work is divided into sections covering the many available books, magazines, user groups, abstracts, hardware, and software which add to its ease of use. We spent our first few months with our ZX-81 last winter floundering from bookstores to libraries, buying magazines and making phone calls, and finally found that we had acquired a modest knowledge of the books and accessories available for our computer. This book could have saved us the effort.

With this slim book, the product reviews from our newsletter, and the other periodicals, you should not have to waste the time and money required to find where you an most wisely spend your money expanding your own ZX/TS computer into a much larger data processing system. This book could save you its small price on the very first peripheral that you buy.

COMPUTERS FOR KIDS
Sinclair ZX-81 edition
by Sally Greenwood Larsen

Creative Computing Press
39 E. Hanover Ave.
Morris Plains, NJ 07950

$4.95

This book begins with a simple definition of computers and what they can do. Using large print and non-technical terms the young reader is taught the principles of program writing. It starts with flow charts which are explained more understandably than in any book we have read. This was followed by the operating rules of the ZX/TS. Several sections then told how to write small programs using proper screen formats and interesting graphics. The few simple programs were enough to whet a child's interest without burdenning her or him with too many examples to key in. The last children's chapter was a glossary of 16 terms needed to write small programs. This was followed by a section for adults to assist them in guiding youthful programmers in the development of computer skills.

Many of the intended users of the ZX/TS computers are children. The small manual that comes with the computer can be difficult for an adult to follow. Put these two facts together and you have a problem. We find this book to be a most excellent solution. This little volume might also help those of us who are fairly new to computing, but old enough to vote, learn how to use our powerful, if diminutive, computers. In short, we heartily recommendits purchase.

CONTINUED FROM PAGE 7

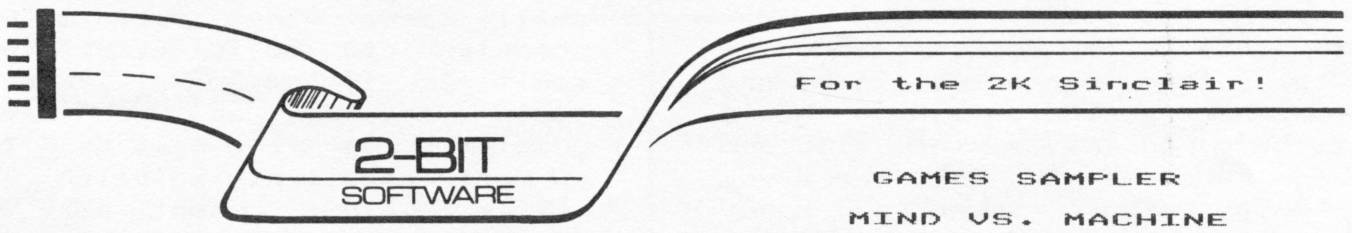
Besides the program on tape, upon opening the package you will find very thorough documentation of the software as well as some very useful short programs, in BASIC, to help the programmer use these routines. You may write, and read, either alpha or numeric data to or from your cassette so the applications served by this product could range from statistics to mailing lists. As promised by their literature, this is a very 'user-friendly' tool. To our knowledge it is unique and we find it to be well worth the price. We loaded this program on the first try and were using it within five minutes. Now that we have this program, we don't know how we've lived without it! We are looking forward to trying the full Cosmonics line. You may order this product from: COSMONICS, Box 10358, San Jose, CA 95157. Please add $1.50 for shipping and handling.

FLIGHT SIMULATION by Timex/Sinclair

Few of us will ever experience the thrill of flying an aircraft although most of us wish we could. With 'Flight Simulation', a software package from an English company called Psion released in the U.S. by Timex/Sinclair, we all can take off into the wild blue yonder.

This is one program that must be studied before using. Upon loading completion, you are asked whether you want to land only or fly a complete flight. After answering this question, you are asked whether or not you want to deal with wind conditions. Answer this question and you start flying. Your cockpit instrumentation is quite thorough. You are given readings of speed, rate of climb or descent, landing gear, flap, and throttle positions, altitude, and several radio direction finder indicators. You may also look at a map of the terrain that you are flying over. Back in the cockpit, you may glance out the window at the horizon to find out whether you are banking, climbing, or descending. You must adjust the controls to fly to the vicinity of the airport where you must stay level, descend smoothly, lower your flaps and landing gear, and land. To assist you, you may choose a visual display of the runway, once over the threshold, and visually guide your plane in for a landing. If you crash, the screen slowly disintegrates and a message informs you of your speed at impact. A successful landing results in the plane coasting to a stop on the runway, and you must stop before the end of the runway, and the message, 'That was a smooth touch-down'. By the way, if you land from the east, don't hit the hills on the way down!

We find this to be a fine flight simulator and it will give you many hours of enjoyment. This program can be bought at most of the retail stores that sell the TS1000 for the listed price of $19.95.



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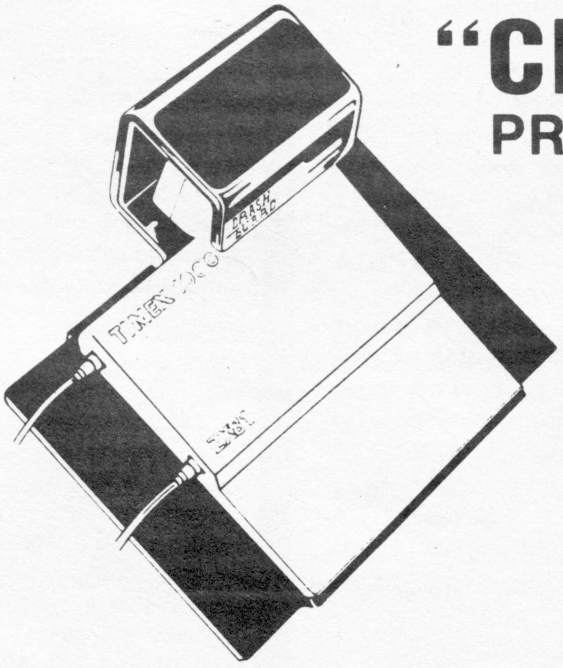
A BASIC Understanding

It is no mystery why writing a computer program is so difficult for the beginner. Instead of computers speaking our language, we are forced to learn many new words to even operate them. To this end we dedicate this column to help eliminate the confusion over computer terminology so that communication regarding these powerful micro-machines is improved.

BIT, BYTE, and BINARY -- The first thing to know about our computers is the fact that to them there are only two ways of looking at the world: high-state or low-state. Every number, letter, or command is reduced to a series of bits which represent these objects in a language we call binary. Binary refers to a system with 2 parts. A bit is either high or low, symbolized by a one or a zero. As our ZX/TS's are what is called an eight-bit computer, we know from this that these bits are sent in packets or words consisting of strings of eight bits each. A group of eight bits is called a byte. Our units can keep track of the location, in memory, of 65536 (if you have extended your memory with a 64K RAM pack) of them--very many indeed! Each number or letter can be represented by two, or fewer, bytes. Each command takes, at the most, five bytes of memory.

CPU -- This stands for Central Processing Unit. The ZX/TS uses one known by the code name of Z80A. This single chip, designed and produced by a company called ZILOG, is the heart of our computer. Every piece of information that goes into, and comes out of our ZX/TS must pass through and be controlled by our CPU. This Z80A acts like an air-traffic controller, seeing to it that the stream of bytes almost always gets to its proper destination. When, for some reason, things go awry, we get a crash! CONTINUED ON PAGE 21



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Z EXTRA by Sinware

Many of us wish to add special graphics presentations to our programs but find the machine language expertise required to be beyond our capabilities. This program, Z Extra, from the SINWARE group that brought us Hot Z, allows us all to draw 'slides' using our ZX/TS keyboards and then call them to the screen using BASIC.

This package of software is accompanied by SINWARE's usual fine documentation. You receive 16 full pages of instructions as well as two full size 'maps' of various functions that may be called from the keyboard. You may configure the program for ZX/TS computers with 16 K RAM, or upto 64K. The 16K version allows the drawing of about 28 screens while users with full memory expansion can produce up to 99 screens. These screens are capable at speeds ranging from a new picture every tenth of a second, for rather effective animation, to once every 15 minutes. The capacity of this one feature for games is mind-boggling.

You enter this program, of course, with empty memory. You may then assign a name to your first screen using up to 15 characters. You may 'paint' your screens with any of the ZX/TS character / graphics set. Your unit, enhanced with this software, will continue to print characters if you hold down a key. You may move the cursor around the screen to paint character / graphics using the arrow keys. The cursor may go over a character without erasing it. Removal may be done using DELETE. After positioning character / graphics, you may set them up at 4 or 8 times normal size. There is a special draw mode which is similar to PLOT and UNPLOT. Unlike BASIC, however, you do not have to enter pixel coordinates. In this mode you have eight dedicated keys to draw lines horizontally, vertically, or diagonally. You may draw or erase lines.

Once screens have been drawn, they may be stored in memory or on cassette. Simple one key commands govern the cassette saving and loading of pictures. You may assign names to your pictorial files prior to storage and then recall them by the same name. You may scroll your pictures horizontally or vertically. Also, the user may reverse screen colors from black to white / white to black. Alternating screens very quickly in this mode, which may be done automatically, results in extremely catchy displays. For those with the ZX/TS printer, you may copy to the printer without software patches. We've also found the Mindware printer to work, but you must tape the output together for hardcopies of the screen.

Probably the most exciting option for those of us who are 'BASIC-only' programmers, is the ZEXBAS software package on side 2 of the cassette. With this routine, you may call down from protected memory up to 10 screens and attach them to your BASIC program in string arrays.

CONTINUED ON PAGE 21

SINWARE provides high-quality machine-code programs for the TS1000 or ZX81.

HOT Z

HOT Z is the machine-programming editor, debugger and disassembler that takes the mystery out of assembly language. Over 40 cursor-driven commands give you an interactive system for entering, revising and relocating code. Full-screen listings with your labels let you understand other programs and capture the power of ROM routines for your own programs.

SQ said of **HOT Z**: *"Easily the best machine language debugging package I have ever seen for the ZX81. . . If you program in machine language and need the best tool for the job, buy **HOT Z**."*

HOT Z is just $19.95 + $2.00 pp on cassette in different versions for 16K or 32K+. Please specify. **NOW ON EPROM** (four 2716's) mapped to the 8-16K block for the Hunter or similar board, **HOT Z-E** is $40.

SINWARE
BOX 323, DIXON, NM 87527

PROGRAM EXCHANGE

MATH

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Z EXTRA CONTINUED FROM PAGE 18

If you've written a nice BASIC game but find that your displays are not realistic enough for you, then you need this program to liven up your efforts.

To sum, we found this to be the best display manager program we've seen for the ZX/TS. Typically of SINWARE, the documentation is more thorough than you will receive in any other package. The cost for Z EXTRA is $19.95 plus $2.00 for shipping and handling. You may order it from: SINWARE, P.O.Box 323, Dixon, NM 87527.

'DATA & READ' CONTINUED FROM PAGE 6

We hope that you find that this clarifies to you how to get around the lack of DATA, and READ statements and increases the capabilities of your computer for you. You may call or write to us if you have any questions.

SOLUTION #1

```
10 LET A$="100918043290573866449155560
   376002070115892279011O6"
20 DIM B$(10,5)
30 LET B=1
40 FOR C=1 TO 10
50 LET B$(C)=A$(B to B+4)
60 LET B=B+5
70 PRINT VAL B$(C)*0.01
80 NEXT C
```

SOLUTION #2

CHANGE LINES:

```
10 LET A$="APPLE_BALLBELLSPETER__SAM
   _JOHNFRANK_PAULZX-81TIMEX"
70 PRINT B$(C)
```

A BASIC Understanding CONTINUED FROM PAGE 17

MACHINE CODE -- A type of language that is a step up from binary, but is not as friendly to the user as BASIC. It is more compact thereby resides in less space in memory and is acted on much faster by the CPU. In the peculiar form of notation that machine code uses, you do not assign a value to a variable as is, 'LET A=10', but instead you load a register as, 'LD A,10'. Typically, machine code runs about 5 times faster than BASIC, but this is a generalization that does not hold true for all operations.

RAMS, ROMS, PROMS, and EPROMS -- our ZX/TS may use a variety of types of memory. When discussing computers, the word that floats about the most often is RAM. This stands for Random Access Memory. Imagine that you had a place in your brain where you could perfectly memorize anything that you were told--but once you fell asleep all would be forgotten. This is like RAM to a computer except computers don't sleep, they are shut off. ROM, or Read Only Memory, is like your instincts for breathing. You can never change it as you were born with it. Our ZX/TS cannot change ROM instructions as a ROM is permanently 'wired' at the factory. There are types of ROMs you may program once--PROMs. This symbolizes Programmable Read Only Memory. PROMS that you can Erase with ultra-violet light are called EPROMs. Usually the capacity of these RAMs and ROMs is expressed in 'K'. A 'K' is 1024 bytes. 16K is actually 16384 bytes while 64K really means 65536 bytes.

Hopefully this too short glossary will help you get past some of computer jargon and start on the process of actually making your ZX/TS work for you. Other BASIC Understanding articles will make you fluent in the language of your computer.

WHAT'S UNDER THE SUN CONTINUED FROM PAGE 2

specific areas of ZX/TS use such as astronomy, ham radio, machine code, etc. We will have more information on the Network next month.

HB Industries, producer of the line filter as described within, will release a keyboard interface kit in February that will use the expansion slot in the back of our ZX/TS computer. We've been told that the price should be in the order of $20.

We have received press releases on two new products from the makers of Z EXTRA. SINWARE's indispensable machine code aid, HOT Z, reviewed in this publication several months ago, will now be sold on four EPROMS that will fit on boards such as the Hunter board that was reviewed in our last bulletin. These chips will be available for $30 to present HOT Z owners, $40 to others. Another new product that they sell is a NAME file describing the ZX/TS ROM. This software, $10 on cassette, is an invaluable aid for any of those wishing to call or jump to any of the routines on the ROM. You must have one of the versions of HOT Z to load this tape.

AERCO has now expanded their product line. The parallel interface, reviewed in October, is now priced at $119, including the necessary software to drive it on ROM. They also make a dedicated floppy disc interface that sells for $179 with DOS. It will operate up to 4 of most any kind of drive. Their own 5.25" double density drive lists at $189 each. We continue to think if you are serious about expanding your ZX/TS, this is the company to contact.

CO-OP NEWS

We have made mass purchases of several fine products. Presently we have a supply of line filters from HB Industries that list at $19.95 each. As we bought a large number of them, we can sell them at $14.95 plus shipping charges. Illinois residents must add sales tax. Available under the same terms are C-20 computer certified tapes priced at $0.72 each. Please enquire about other products available to members at a discount. We have tried, and use, all the items sold through the co-op. Please call our attention to anything that you feel merits purchase for our members.

Classified Ads

WANTED: Non-Functioning, out of warranty, 16 K RAM pack with no physical damage--$5.00. Write to-S.U.N. Box RP, 2170 Oak Brook Circle, Palatine, IL 60074.

WANTED: Anyone in the Chicago Heights area interested in discussing Timex/Sinclair 1000, call Rich at (312)755-5539.

WANTED: Authors and reviewers for a major publishing house. Expertise with the ZX/TS computers a must. Box BP, S.U.N., 2170 Oak Brook Circle, Palatine, IL., 60074.

Are there sufficient radio hams in S.U.N. to form a sub group? Is there any reason to? Contact W9IWI, 9142 N. Crawford, Skokie, IL 60076.

FOR SALE: 12" B/W Motorola monitors with schematics; chassis only. Box LCM, S.U.N., 2170 Oak Brook Circle, Palatine, IL., 60074.

All members are entitled to (1) 20 word classified ad at no charge. Additional ads are $.05 per word per issue. Call (312)934-9375.

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BASICLY SPEAKING

This short game was sent to us by one of our members overseas. It is a self starter in that after keying it in to the ZX/TS, save it on cassette, and after it is recorded the game will begin. Hereafter, it will start every time you load it into the computer without you having to push (RUN). Note: In Line 860, after saving, the "F" will become inverse; Also, in line 210, K$=(SHIFT)(GRAPHICS)(6)(F)(SPACE)(F)(6); Our thanks and an extra 100 lines to Jorge Salazar.

```
 10 RAND
 20 CLS
 30 PRINT AT 2,7;"EARTH DEFENDER"
 40 PRINT AT 4,0;"YOU COMMAND A
    SHIP DEFENDING THE"
 50 PRINT "MOST IMPORTANT SPACE
    LANE TO THE"
 60 PRINT "EARTH.  A CLOUD OF
    ALIEN RAIDERS"
 70 PRINT "APPEARS TO BE HEADED
    TO DESTROY"
 80 PRINT "OUR PLANET.  CHOOSE A
    LAUNCHING"
 90 PRINT "SPEED FROM 1 TO 99 AND
    FIRE ONE"
100 PRINT "OF YOUR 15 MISSILES BY
    PUSHING"
110 PRINT "THE (ENTER) KEY."
120 PRINT AT 13,0;"IF YOU FAIL,
    YOU RETURN TO EARTH"
130 PRINT "IN DISGRACE."
140 PRINT AT 16,0;"TO START, PUSH
    THE (S) KEY."
150 LET T$="---------------"
160 LET C=0
170 DIM A$(60)
180 LET B$="<"
190 LET LL=15
200 LET A$=""
210 LET K$="▚▞"
220 FOR N=1 TO 10
230 LET K=INT (1+RND*20)
240 LET A$(K)="*"
250 FOR M=20 To 40 STEP 10
260 LET A$(K+M)="*"
270 NEXT M
280 LET A$(40+N)="*"
290 LET A$(10+N)=" "
300 NEXT N
310 IF INKEY$="" THEN GOTO 310
320 CLS
330 LET Q$=" ALIENS LEFT  "
340 FOR N=1 TO 10
350 LET M=(N-1)*6+1
360 PRINT AT 4+N,1;A$(M TO M+5)
370 FOR O=M TO M+5
380 IF A$(O)="*" THEN LET C=C+1
390 NEXT O
400 NEXT N
410 LET I=16+INT (RND*5)
420 PRINT AT 0,12;C;Q$
430 LET X=I
440 LET J=INT (RND*7)+20
450 LET Y=J
460 PRINT AT 1,15;LL;" MISSILES
    LEFT "
470 PRINT AT X+1,Y-2;K$
480 PRINT AT X,Y;B$
490 PRINT AT 2,28;"  "
500 PRINT AT 2,15;"LAUNCH SPEED=";
510 INPUT V
520 PRINT V
530 LET F=120-V
540 FOR Y=J TO 1 STEP -1
550 LET K=J-Y
560 PRINT AT X,Y+1;" "
570 LET X=INT (I-(K*K/F))
580 IF X<0 OR X>20 THEN GOTO 680
590 PRINT AT X,Y;B$
600 IF NOT (X>4 AND X<15 AND Y<7)
    THEN GOTO 660
610 LET Z=(X-5)*6+Y
620 IF A$(Z)="_" THEN GOTO 660
630 LET A$(Z)="_"
640 LET C=C-1
650 IF C<=0 THEN GOTO 810
660 NEXT Y
670 PRINT AT X,Y+1;"_"
680 PRINT AT I+1,J-2;"_____"
690 LET LL=LL-1
700 IF LL>=1 THEN GOTO 410
710 PRINT AT 0,12;"________";T$;AT
    1,16;T$;AT 2,16;T$
720 IF C>8 THEN GOTO 760
730 PRINT AT 0,0;"ONLY ";C;Q$
740 PRINT "PRETTY GOOD JOB..."
750 GOTO 830
760 PRINT AT 0,0;C;Q$
770 PRINT "BAD SHOOTING, TURKEY."
780 PRINT "TO TRY AGAIN, PUSH (S)"
790 IF INKEY$="" THEN GOTO 790
800 GOTO 1
810 CLS
820 PRINT AT 0,0;"YOU HERO.  YOU
    SAVED EARTH."
830 PRINT "PUSH (S) FOR A NEW
    BATTLE."
840 IF INKEY$="" THEN GOTO 840
850 GOTO 1
860 SAVE "EARTHDEF"
870 GOTO 1
```

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